

AL.2.2010-105

University of Alberta Library



0 1620 3415590 1

and teacher: Use this cover sheet for mailing or faxing.

**ASSIGNMENT BOOKLET**

SCN2242 Chemistry 20

Module 6 Assignment

**FOR STUDENT USE ONLY**

Date Assignment Submitted:

\_\_\_\_\_

(If label is missing or incorrect)

Student File Number:

\_\_\_\_\_

Time Spent on Assignment:

\_\_\_\_\_

Module Number: \_\_\_\_\_

**FOR OFFICE USE ONLY**

Assigned

Teacher: \_\_\_\_\_

Assignment

Grading: \_\_\_\_\_

Graded by: \_\_\_\_\_

Date Assignment Received: \_\_\_\_\_

**Student's Questions  
and Comments**

Apply Module Label Here

Name

Address

Postal Code

Please verify that preprinted label is for  
correct course and module.

**Teacher's Comments**

\_\_\_\_\_  
Teacher

## INSTRUCTIONS FOR SUBMITTING THIS DISTRIBUTED LEARNING ASSIGNMENT BOOKLET

When you are registered for distributed learning courses, you are expected to regularly submit completed assignments for correction. Try to submit each Assignment Booklet as soon as you complete it. Do not submit more than one Assignment Booklet in one subject at the same time. Before submitting your Assignment Booklet, please check the following:

- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

### MAILING

1. Do **not** enclose letters with your Assignment Booklets. **Send all letters in a separate envelope.**
2. Put your Assignment Booklet in an envelope and take it to the post office and have it weighed. Attach **sufficient postage** and seal the envelope.

### FAXING

1. Assignment Booklets may be faxed to the school with which you are registered. Contact your teacher for the appropriate fax number.
2. All faxing costs are the responsibility of the sender.

### E-MAILING

It may be possible to e-mail your completed Assignment Booklet to the school with which you are registered. You also may be **required** to e-mail some of your assignments. Contact your teacher for the appropriate e-mail address.



# Chemistry 20

Learn  EveryWare

 we educate

Module 6  
**STOICHIOMETRY**  
*ASSIGNMENT BOOKLET*



## FOR TEACHER'S USE ONLY

### Summary

|                     | Total Possible Marks | Your Mark |
|---------------------|----------------------|-----------|
| Lesson 1 Assignment |                      |           |
| Lesson 2 Assignment |                      |           |
| Lesson 3 Assignment |                      |           |
| Lesson 4 Assignment |                      |           |
|                     |                      |           |

### Teacher's Comments

Chemistry 20  
Module 6: Stoichiometry  
Assignment Booklet  
ISBN 978-0-7741-3043-1

Cover Art: © Photodisc/Getty Images

|                               |   |
|-------------------------------|---|
| This document is intended for |   |
| Students                      | ✓ |
| Teachers                      | ✓ |
| Administrators                |   |
| Home Instructors              |   |
| General Public                |   |
| Other                         |   |



You may find the following Internet sites useful:

- Alberta Education, <http://www.education.gov.ab.ca>
- Learning Resources Centre, <http://www.lrc.education.gov.ab.ca>
- Tools4Teachers, <http://www.tools4teachers.ca>

Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

Copyright © 2008, Alberta Education. This resource is owned by the Crown in Right of Alberta, as represented by the Minister of Education, Alberta Education, 10155 – 102 Street, Edmonton, Alberta, Canada T5J 4L5. All rights reserved.

This courseware was developed by or for Alberta Education. Third-party content has been identified by a © symbol and/or a credit to the source and must be used as is. This courseware may be reproduced in any form, including photocopying, without the written permission of Alberta Education. Changes can be made only to content owned by Alberta Education. For more detailed information, refer to the Terms of Use Agreement. Every effort has been made to acknowledge the original source and to comply with Canadian copyright law. If cases are identified where this effort has been unsuccessful, please notify Alberta Education so corrective action can be taken.

**THIS COURSEWARE IS NOT SUBJECT TO THE TERMS OF A LICENCE FROM A COLLECTIVE OR LICENSING BODY, SUCH AS ACCESS COPYRIGHT.**

**MODULE 6: LESSON 1 ASSIGNMENT****Lesson 1 Assignment: Chemical Equations**

1. Translate the following descriptions into balanced chemical equations. Classify each reaction according to its reaction type.
  - a. Aqueous solutions of calcium hydroxide and hydrochloric acid are mixed, producing aqueous calcium chloride and water.
  - b. Solid lead(IV) oxide decomposes to its elements.
  - c. Propane,  $\text{C}_3\text{H}_8(\text{g})$ , combusts in the presence of oxygen to produce carbon dioxide and water vapour.
2. Complete the following reactions. Ensure each reaction is balanced.
  - a.  $\text{NaCl}(\text{aq}) + \text{Ba}(\text{s}) \rightarrow$
  - b.  $\text{Al}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow$
  - c.  $\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow$

|  |
|--|
|  |
|  |
|  |

3. A student mixed a solution of aqueous calcium hydroxide with a solution of phosphoric acid. A precipitate developed.

Write a net ionic equation for this system. Identify any spectator ions present in the system.

4. Summarize your learning in this lesson by providing an answer to each of the focus questions listed in the table. You may use clear and descriptive examples in your answer.

| Focus Question                                                                                 | Answer |
|------------------------------------------------------------------------------------------------|--------|
| What information about a chemical system is contained within a balanced chemical equation?     |        |
| What information about a chemical system is not contained within a balanced chemical equation? |        |
| What is conservation of mass and how is it demonstrated in a balanced chemical equation?       |        |



## MODULE 6: LESSON 2 ASSIGNMENT

### Lesson 2 Assignment: Gravimetric Stoichiometry

#### Lab: Decomposition of Malachite

1. Subtract the mass of the flask and malachite from the mass of the empty flask to obtain the mass of copper(II) oxide produced (g).
2. Compare the mass calculated in step 1 above with the mass predicted in the pre-lab assignment. Calculate a percent difference using the prediction and the data obtained from the laboratory parts of the activity.
3. Do the results of the experiment support the predictions made using the stoichiometric method?

## **MODULE 6: LESSON 3 ASSIGNMENT**

### **Lesson 3 Assignment: Gas Stoichiometry**

#### **Lab: Producing Hydrogen**

Prepare a data table and record your observations as you work through the procedure.

#### **Analysis**

1. Use the mass of magnesium, the temperature, and atmospheric pressure to predict the volume of hydrogen of gas that will be produced by the reaction.
2. Use the measured and predicted volumes of hydrogen to calculate a percentage yield and a percentage difference for the experiment. Comment on the relationship between the values obtained for the percentage yield and percentage difference you calculated for this experiment.



3. Determine whether the predictions made using the stoichiometric method are supported by the data collected from this experiment.

## **Case Study: Producing Hydrogen for Fuel Cells**

### **Questions**

1. Based on the stoichiometry of the reactions given on the previous page, what are the ratios of hydrogen to starting material for each of the three processes? To evaluate hydrogen sources, is it better to compare chemical amount ratios or mass ratios?
2. For the production of hydrogen and any other industrial technological process, what are the three main criteria that are used to judge the process?
3. A source of hydrogen is an important issue if hydrogen fuel cells are going to become useful in automobiles. What perspectives are mentioned in the case study? What important perspective is missing?

## MODULE 6: LESSON 4 ASSIGNMENT

### Lesson 4 Assignment: Solution Stoichiometry

#### Lab: Analysis of Silver Nitrate

#### Analysis

1. Use the data you collected to calculate the amount concentration of silver nitrate in the solution.
2. Describe a test that could be performed to ensure that all the silver ions from the solution reacted to form a precipitate. Indicate what would be observed in a positive result for the presence of silver ions in the solution and what would be observed in a negative result.

#### Questions

Answer the following questions using complete sentences.

1. A technician mixes a solution containing silver nitrate with a solution containing sodium chromate. 2.89 g of precipitate is produced. Calculate the mass of silver nitrate present in the first solution.

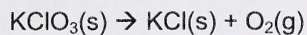


2. A solution containing chromium(III) chloride is analyzed using a reaction with zinc. If 11.5 g of zinc react, what mass of chromium(III) chloride was present in the solution tested?
3. What volume of oxygen at STP is needed to completely burn 15.0 g of methane in a Bunsen burner?
4. In a hydrogen fuel cell, hydrogen and oxygen gases react to produce water vapour. What volume of hydrogen at 40 °C and 150 kPa can be burned in a fuel cell using 300 L of oxygen gas measured under the same conditions?

- Ammonium sulfate fertilizer is manufactured by having sulfuric acid react with ammonia. In the laboratory, a reaction was done using 50.0 mL of sulfuric acid with 24.4 mL of a 2.20-mol/L ammonia solution. What was the concentration of the sulfuric acid solution?
- 1.63 g of precipitate is collected from a reaction of a silver nitrate solution with 10.0 mL of hydrochloric acid. Calculate the concentration of a hydrochloric acid solution.
- A 5.95-g sample of  $\text{AgNO}_3(\text{s})$  is reacted with a solution of  $\text{BaCl}_2(\text{aq})$ . 4.00 g of precipitate were collected. Calculate the percentage yield for the reaction.



8. 6.32 g of potassium chlorate reacts according to the following reaction:



- a. Balance the reaction equation given.
- b. Determine the quantity of oxygen produced by the reaction as a mass and as a volume at a 105 kPa and 300 K.

**Once you have completed all of the questions, submit your work to your teacher.**







